

C GAMMA-CADINENE

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GAMMACADINENE

*Unless otherwise noted all references are to Duke, James A. 1992. Handbook of phytochemical constituents of GRAS herbs and other economic plants. Boca Raton, FL. CRC Press.

Plant	Part	Low PPM	High PPM	StdDev PPM	Reference
Achillea millefolium	Leaf	--	--	--	--
Agastache rugosa	Tissue Culture	--	--	--	Jim Duke's personal files.
Ageratum conyzoides	Shoot	--	2520	5.377506816867179	R. Vera, (1993); Chemical composition of the essential oil Ageratum conyzoides L. (Asteraceae) from Reunion, Flavour Fragr. J., Vol.8, 257-260.
Aloysia citrodora	Plant	2	14	-0.45984857009077795	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
Alpinia officinarum	Rhizome	--	--	--	Wealth of India.
Angelica archangelica	Plant	--	--	--	--
Angelica archangelica	Root	2	14	1	--
Aniba rosaeodora	Plant	--	--	--	--
Artemisia herba-alba	Plant	--	--	--	--
Artemisia salsolooides	Shoot	50	50	-0.1218975256470905	V. Kaul, P. Weyerstahl, H. Wahlberg, H. Marschall, (1992); Volatile constituents of the essential oil and the absolute of Artemisia salsolooides Willd. from Ladakh, Flavour and Fragrance journal, Vol.7, 299-305.

Plant	Part	Low PPM	High PPM	StdDev PPM	Reference
<i>Boswellia sacra</i>	Essential Oil	--	--		Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
<i>Callicarpa americana</i>	Leaf	--	3	-0.4545809267588206	--
<i>Cananga odorata</i>	Flower	--	--		--
<i>Cannabis sativa</i>	Essential Oil	--	--		--
<i>Cannabis sativa</i>	Plant	--	--		Turner, C. E., El Sohly, M. A., Boeren, E. G. 1980. Constituents of Cannabis sativa L. XVII. A Review of the Natural Constituents. <i>J Natural Products</i> , 43: 169-234.
<i>Chrysanthemum x morifolium</i>	Plant	20	75	0.5048602026128912	Wealth of India.
<i>Cinnamomum verum</i>	Leaf	--	24	-0.2185114629097392	Mallavarupu, G. R. et al. 1995. Investigation of the essential oil of cinnamon leaf grown at Bangalore and Hyderabad. <i>Flav. & Fragr. J.</i> , 10: 239-242.
<i>Cinnamomum verum</i>	Leaf Essent. Oil	--	--		--
<i>Citrus paradisi</i>	Pericarp	--	--		--
<i>Citrus reticulata</i>	Fruit	1	2	-0.9084313290424243	--
<i>Citrus sinensis</i>	Fruit	1	2	-0.9084313290424243	--
<i>Copaifera spp</i>	Gum	--	--		--
<i>Coridothymus capitatus</i>	Shoot	0.1	0.1	-0.23299885224282407	Lagouri, V., Blekas, G., Tsimidou, M., Kokkini, S., and Boskou, D. 1993. Composition and Antioxidant Activity of Essential Oils from Oregano Plants Grown Wild in Greece. <i>Z. Lebensm Unters Forsch</i> 197: 20-23.
<i>Cymbopogon winterianus</i>	Plant	40	158	1.8174967294064082	Guenther, E., The Essential Oils, 6 volumes, D. van Nostrand, New York, 1948-1952.
<i>Elsholtzia pilosa</i>	Shoot	36	36	-0.15306823851964102	--

Plant	Part	Low PPM	High PPM	StdDev PPM	Reference
<i>Elsholtzia polystachya</i>	Leaf	10	10	-0.37589110547579346	Mathela,C.S., Melkani,A.B., Bisht,J.C., Pant,A.K., Bestmann,H.J., Erler,J., Kobold,U., Rauscher,J. and Vostrowsky,O. 1992. Chemical Varieties of Essential Oils from <i>Elsholtzia polystachya</i> from Two Different Locations in India. <i>Planta Medica</i> 58: 376-379.
<i>Elsholtzia polystachya</i>	Leaf	--	10	-0.37589110547579346	Mathela,C.S., Melkani,A.B., Bisht,J.C., Pant,A.K., Bestmann,H.J., Erler,J., Kobold,U., Rauscher,J. and Vostrowsky,O. 1992. Chemical Varieties of Essential Oils from <i>Elsholtzia polystachya</i> from Two Different Locations in India. <i>Planta Medica</i> 58: 376-379.
<i>Eucalyptus globulus</i>	Fruit Essent. Oil	--	--	--	--
<i>Eucalyptus globulus</i>	Leaf Essent. Oil	--	1000	-0.7812021248174129	--
<i>Humulus lupulus</i>	Fruit	60	60	0.07091843089178781	--
<i>Hyssopus officinalis</i>	Plant	--	--	--	--
<i>Juniperus communis</i>	Fruit	16	164	1.8269938624979614	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
<i>Laurus nobilis</i>	Leaf	--	--	--	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
<i>Lavandula angustifolia</i>	Flower	--	--	--	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
<i>Levisticum officinale</i>	Root	0	5	-1	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
<i>Lindera benzoin</i>	Leaf	--	3	-0.4545809267588206	--
<i>Lycopus uniflorus</i>	Plant	8	8	-0.5547379575698274	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.

Plant	Part	Low PPM	High PPM	StdDev	Reference
<i>Melissa officinalis</i>	Shoot	1	25	-0.17755951291950214	Deutsche Apot. Zit. 129(4):155-163. W. Schulze et al. Die Melisse.
<i>Mentha longifolia</i>	Shoot	1	75	-0.06623553837467899	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
<i>Mentha spicata</i>	Leaf	2	33	-0.11733883554584716	--
<i>Metrosideros sclerocarpa</i>	Leaf	53	212	1.894872308691561	--
<i>Micromeria croatica</i>	Leaf	360	360	3.5585999586755634	Kirimer, N., Ozek, T., and Baser, K.H.C. 1991. Composition of the Essential Oil of <i>Micromeria congesta</i> . J. Ess. Oil Res., 3: 387-393.
<i>Micromeria varia</i>	Shoot	24	24	-0.1797859924103986	Pedro, L.G., et al. 1995. Composition of the Essential oil of <i>Micromeria varia</i> Benth. ssp. <i>thymoides</i> (Sol. ex Lowe) Perez var. <i>thymoides</i> , and endemic species of the Madeira Archipelago. flav. & Fragr. J. 10(3): 199-202.
<i>Micromeria varia</i>	Shoot	--	15	-0.19982430782846677	--
<i>Murraya koenigii</i>	Leaf	--	0	-0.4883051358801179	--
<i>Ocimum basilicum</i>	Plant	--	--		Duke, J. A. Writeups or information summaries on approximately 2,000 economic plants, USDA, ARS, Beltsville, MD 20705.
<i>Ocimum basilicum</i>	Leaf Essent. Oil	--	22800	1.411528302781677	--
<i>Ocimum basilicum</i>	Essential Oil	--	--		--
<i>Opopanax chironium</i>	Essential Oil	--	--		--
<i>Origanum onites</i>	Shoot	0	0	-0.23322150019191376	Lagouri, V., Blekas, G., Tsimidou, M., Kokkini, S., and Boskou, D. 1993. Composition and Antioxidant Activity of Essential Oils from Oregano Plants Grown Wild in Greece. Z. Lebensm Unters Forsch 197: 20-23.
<i>Origanum onites</i>	Shoot	--	75	-0.06623553837467899	Biondi, D., Cianci, P., Geraci, C. and Ruberto, G. 1993. Antimicrobial Activity and Chemical Composition of Essential Oils from Sicilian Aromatic Plants. Flav. & Fragr. J. 8: 331-7.

Plant	Part	Low PPM	High PPM	StdDev PPM	Reference
Origanum vulgare	Plant	0	0	-0.6812571408752266	Sezik, E., Tumen, G., Kirimer, N., Ozek, T., and Baser, K.H.C. 1993. Essential Oil Composition of Four <i>Origanum vulgare</i> Subspecies of Anatolian Origin. <i>J. Ess. Oil Res.</i> , 5: 425-431.
Origanum vulgare	Shoot	0	0	-0.23322150019191376	Lagouri, V., Blekas, G., Tsimidou, M., Kokkini, S., and Boskou, D. 1993. Composition and Antioxidant Activity of Essential Oils from Oregano Plants Grown Wild in Greece. <i>Z. Lebensm Unters Forsch</i> 197: 20-23.
Origanum vulgare	Plant	7	7	-0.5705528554830023	Sezik, E., Tumen, G., Kirimer, N., Ozek, T., and Baser, K.H.C. 1993. Essential Oil Composition of Four <i>Origanum vulgare</i> Subspecies of Anatolian Origin. <i>J. Ess. Oil Res.</i> , 5: 425-431.
Origanum vulgare	Plant	0	0	-0.6812571408752266	Sezik, E., Tumen, G., Kirimer, N., Ozek, T., and Baser, K.H.C. 1993. Essential Oil Composition of Four <i>Origanum vulgare</i> Subspecies of Anatolian Origin. <i>J. Ess. Oil Res.</i> , 5: 425-431.
Origanum vulgare	Plant	0	0	-0.6812571408752266	Sezik, E., Tumen, G., Kirimer, N., Ozek, T., and Baser, K.H.C. 1993. Essential Oil Composition of Four <i>Origanum vulgare</i> Subspecies of Anatolian Origin. <i>J. Ess. Oil Res.</i> , 5: 425-431.
Origanum vulgare	Plant	50	200	2.481722441759754	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
Origanum vulgare	Shoot Essent. Oil	200	9700	--	--
Panax ginseng	Flower Essent. Oil	--	--	--	--
Pelargonium graveolens	Essential Oil	--	--	--	--
Petroselinum crispum	Leaf	--	--	--	--
Pimenta dioica	Fruit	51	51	-0.08104963530490027	--
Pimenta dioica	Leaf	--	50	0.07376501614150445	--

Plant	Part	Low PPM	High PPM	StdDev PPM	Reference
Pimenta racemosa	Leaf	--	--		Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
Pinus sylvestris	Resin, Exudate, Sap	--	--		List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.
Pinus sylvestris	Wood	--	--		--
Pinus sylvestris	Essential Oil	--	--		--
Pinus sylvestris	Leaf Essent. Oil	--	2500	-0.6303261779642645	--
Piper nigrum	Fruit	--	--		--
Piper nigrum	Fruit Essent. Oil	--	--		--
Rheum palmatum	Rhizome	--	0.5		--
Rosmarinus officinalis	Leaf	1	1	-0.4770637328396855	Soliman, F.M., El-Kashoury, M.M., Fathy, M.M. and Gonaid, M.H. 1994. Analysis and Biological Activity of the Essential Oil of Rosmarinus officinalis L. from Egypt. Flavour and Fragrance J. 9: 29-33.
Rosmarinus officinalis	Leaf	--	1	-0.4770637328396855	Soliman, F.M., El-Kashoury, M.M., Fathy, M.M. and Gonaid, M.H. 1994. Analysis and Biological Activity of the Essential Oil of Rosmarinus officinalis L. from Egypt. Flavour and Fragrance J. 9: 29-33.
Rosmarinus officinalis	Leaf	--	5	-0.4320981206779557	Soliman, F.M., El-Kashoury, M.M., Fathy, M.M. and Gonaid, M.H. 1994. Analysis and Biological Activity of the Essential Oil of Rosmarinus officinalis L. from Egypt. Flavour and Fragrance J. 9: 29-33.
Rosmarinus officinalis	Plant	--	--		--
Rosmarinus officinalis	Resin, Exudate, Sap	--	--		--

Plant	Part	Low PPM	High PPM	StdDev	Reference
<i>Salvia dorisiana</i>	Shoot	5	5.6	-0.2207532150428935	Tucker, A.O. & Maciarello, M.J. 1994. The Essential Oil of <i>Salvia dorisiana</i> Standley. <i>J. Ess. Oil Res.</i> 6: 97-8.
<i>Salvia gilliesii</i>	Shoot	36	36	-0.15306823851964102	Velasco-Negueruela, A. et al. 1993. The Essential Oil of <i>Salvia gilliesii</i> Benth. <i>J. Ess. Oil Res.</i> 5: 319-320.
<i>Salvia officinalis</i>	Plant	2	14	-0.45984857009077795	--
<i>Salvia officinalis</i>	Leaf Essent. Oil	--	--	--	--
<i>Sassafras albidum</i>	Leaf	0.3	5	-0.4320981206779557	--
<i>Satureja montana</i>	Plant	3	70	0.42578571304701673	--
<i>Satureja thymbra</i>	Shoot	37	37	-0.15084175902874455	Lagouri, V., Blekas, G., Tsimidou, M., Kokkini, S., and Boskou, D. 1993. Composition and Antioxidant Activity of Essential Oils from Oregano Plants Grown Wild in Greece. <i>Z. Lebensm Unters Forsch</i> 197: 20-23.
<i>Scutellaria parvula</i>	Plant	9	9	-0.5389230596566524	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
<i>Sideritis pauli</i>	Shoot	6	6	-0.21986262324653497	Burzaco, A., Velasco-Negueruela, A. and Perez-Alonso, M.J. 1992. Essential Oil Analysis of <i>Sideritis pauli</i> Pau. <i>FFJ</i> 7: 47-8. 1992.
<i>Stevia rebaudiana</i>	Flower	--	80	--	Kinghorn, A. D. (Ed.) 2002. Medicinal and Aromatic Plants - Industrial Profiles. Stevia. The genus Stevia. Taylor & Francis. New York, NY. 211 pp.
<i>Stevia rebaudiana</i>	Leaf	--	35	-0.09485602946498227	Kinghorn, A. D. (Ed.) 2002. Medicinal and Aromatic Plants - Industrial Profiles. Stevia. The genus Stevia. Taylor & Francis. New York, NY. 211 pp.
<i>Syzygium aromaticum</i>	Fruit	--	--	--	--
<i>Syzygium aromaticum</i>	Leaf	25	160	1.3103193505890738	Charalambous, G. (Ed.). 1994. Spices, Herbs and Edible Fungi. Elsevier Science B. V. Amsterdam. 764 pp.

Plant	Part	Low PPM	High PPM	StdDev	Reference
<i>Tagetes lucida</i>	Shoot	--	30	-0.16642711546501981	Bicchi, C., Fresia, M., Rubiolo, P., Monti, D., Franz, C., Goehler, I. 1997. Constituents of <i>Tagetes lucida</i> Cav. ssp. <i>lucida</i> essential oil. <i>Flavor & Fragrance</i> , 12(1): 47-52.
<i>Tamarindus indica</i>	Fruit Essent. Oil	--	4000	--	--
<i>Tanacetum vulgare</i>	Plant	--	--	--	--
<i>Teucrium arduini</i>	Shoot	68	68	-0.08182089481095425	Blazevic, N., Kalodera, Z., Petricic, J., and Plazibat, M. 1992. Essential Oil Content and Composition of <i>Teucrium arduini</i> L. <i>J. Ess. Oil Res.</i> 4: 223-225.
<i>Teucrium arduini</i>	Shoot	--	68	-0.08182089481095425	Blazevic, N., Kalodera, Z., Petricic, J., and Plazibat, M. 1992. Essential Oil Content and Composition of <i>Teucrium arduini</i> L. <i>J. Ess. Oil Res.</i> 4: 223-225.
<i>Teucrium asiaticum</i>	Shoot	0.1	0.1	-0.23299885224282407	Velasco-Negueruela, A. and Perez-Alonso, M.J. 1990. The Volatiles of Six <i>Teucrium</i> Species from the Iberian Peninsula and the Balearic Islands. <i>Phytochemistry</i> 29(4): 1165-9.
<i>Teucrium cyprium</i>	Leaf	0	0	-0.4883051358801179	Arnold, N., Bellomaria, B., Valentini G. and Rafaiani, S.M. 1991. Comparative Study on Essential Oil of Some <i>Teucrium</i> Species from Cyprus. <i>J. Ethnopharm.</i> 35: 105-113.
<i>Teucrium divaricatum</i>	Leaf	0	0	-0.4883051358801179	Arnold, N., Bellomaria, B., Valentini G. and Rafaiani, S.M. 1991. Comparative Study on Essential Oil of Some <i>Teucrium</i> Species from Cyprus. <i>J. Ethnopharm.</i> 35: 105-113.
<i>Teucrium gnaphalodes</i>	Shoot	1.5	1.5	-0.22988178095556908	Perez-Alonso, M.J. Velasco-Negueruela, A. and Lopez-Saez, J.A. 1993. The Essential Oils of Two Iberian <i>Teucrium</i> Species. <i>J. Ess. Oil Res.</i> 5: 397-402.
<i>Teucrium kotschyanum</i>	Leaf	0	0	-0.4883051358801179	Arnold, N., Bellomaria, B., Valentini G. and Rafaiani, S.M. 1991. Comparative Study on Essential Oil of Some <i>Teucrium</i> Species from Cyprus. <i>J. Ethnopharm.</i> 35: 105-113.
<i>Teucrium micropodioides</i>	Leaf	0	0	-0.4883051358801179	Arnold, N., Bellomaria, B., Valentini G. and Rafaiani, S.M. 1991. Comparative Study on Essential Oil of Some <i>Teucrium</i> Species from Cyprus. <i>J. Ethnopharm.</i> 35: 105-113.

Plant	Part	Low PPM	High PPM	StdDev PPM	Reference
<i>Teucrium oxylepis</i>	Shoot	7.9	7.9	-0.21563231221383175	Velasco-Negueruela, A. and Perez-Alonso, M.J. 1990. The Volatiles of Six <i>Teucrium</i> Species from the Iberian Peninsula and the Balearic Islands. <i>Phytochemistry</i> 29(4): 1165-9.
<i>Teucrium oxylepis</i>	Shoot	0.99	0.99	-0.23101728549592623	Velasco-Negueruela, A. and Perez-Alonso, M.J. 1990. The Volatiles of Six <i>Teucrium</i> Species from the Iberian Peninsula and the Balearic Islands. <i>Phytochemistry</i> 29(4): 1165-9.
<i>Teucrium polium</i>	Shoot	0.5	0.5	-0.23210826044646554	Perez-Alonso, M.J. Velasco-Negueruela, A. and Lopez-Saez, J.A. 1993. The Essential Oils of Two Iberian <i>Teucrium</i> Species. <i>J. Ess. Oil Res.</i> 5: 397-402.
<i>Teucrium pseudoscorodonia</i>	Shoot	0.56	0.56	-0.23197467167701175	Velasco-Negueruela, A. and Perez-Alonso, M.J. 1990. The Volatiles of Six <i>Teucrium</i> Species from the Iberian Peninsula and the Balearic Islands. <i>Phytochemistry</i> 29(4): 1165-9.
<i>Teucrium salviastrum</i>	Shoot	1.9	1.9	-0.22899118915921052	Velasco-Negueruela, A. and Perez-Alonso, M.J. 1990. The Volatiles of Six <i>Teucrium</i> Species from the Iberian Peninsula and the Balearic Islands. <i>Phytochemistry</i> 29(4): 1165-9.
<i>Teucrium scorodonia</i>	Shoot	1.22	1.22	-0.23050519521302001	Velasco-Negueruela, A. and Perez-Alonso, M.J. 1990. The Volatiles of Six <i>Teucrium</i> Species from the Iberian Peninsula and the Balearic Islands. <i>Phytochemistry</i> 29(4): 1165-9.
<i>Thymus capitatus</i>	Shoot	0.1	0.1	-0.23299885224282407	Biondi, D., Cianci, P., Geraci, C. and Ruberto, G. 1993. Antimicrobial Activity and Chemical Composition of Essential Oils from Sicilian Aromatic Plants. <i>Flav. & Fragr. J.</i> 8: 331-7.
<i>Thymus funkii</i>	Shoot	16	16	-0.1975978283375703	Vila, R., et al. 1995. Composition and study of the variability of the essential oil of <i>Thymus funkii</i> Cousson. <i>Flav. & Fragr. J.</i> 10(6): 379-383.
<i>Thymus funkii</i>	Shoot	--	16	-0.1975978283375703	Vila, R., et al. 1995. Composition and study of the variability of the essential oil of <i>Thymus funkii</i> Cousson. <i>Flav. & Fragr. J.</i> 10(6): 379-383.
<i>Thymus mastichina</i>	Plant	5	5	-0.6021826513093521	Lawrence, B.M., <i>Essential Oils 1976-1977</i> , <i>Essential Oils 1978</i> , <i>Essential Oils 1979-1980</i> .

Plant	Part	Low PPM	High PPM	StdDev PPM	Reference
<i>Thymus riatarum</i>	Shoot	25	25	-0.17755951291950214	Iglesias, J., Vila, R., Canigueral, S., Bellakdhar, and II Idrissi, A. 1991. Analysis of the Essential Oil of <i>Thymus riatarum</i> . <i>J. Ess. Oil Res.</i> 3: 43-4.
<i>Turnera diffusa</i>	Leaf	--	--		List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.
<i>Valeriana officinalis</i>	Root	--	--		--
<i>Vitex agnus-castus</i>	Leaf	--	0.2	-0.4860568552720314	Ekundayo, O., Laakso, I., Holopainen, M., Hiltunen, R., Oguntiemein, B., and Kauppinen, V. 1990. The Chemical Composition and Antimicrobial Activity of the Leaf Oil of <i>Vitex agnus-castus</i> L. <i>J. Essential Oil Research</i> , 2: 115-119.